

# SEQUENCE LISTING

<110> Svendsen, Allan  
 Lassen, Soren Flensted  
 Kostrewa, Dirk  
 Pasamontes, Luis  
 Lehmann, Martin  
 Tomschy, Andrea  
 Van Loon, Adolphus  
 Vogel, Kurt  
 Wyss, Markus

<120> Phytase Variants

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<140> 09/273,871  
 <141> 1999-03-22

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 <151> 1998-03-23

<150> PA 1998 00806  
 <151> 1998-06-19

<150> PA 1998 01176  
 <151> 1998-09-18

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 <151> 1999-01-22

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 <151> 1998-06-25

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Leu Ala Ala Ala Ser Leu

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taaaatacta aacatatattc accaga cgt gta ctc tcc cct cag cca gtg tcc 153  
Arg Val Leu Ser Pro Gln Pro Val Ser

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tgt gac agc ccg gag ctt ggt tac caa tgc gac cag cag aca acg cac 201  
Cys Asp Ser Pro Glu Leu Gly Tyr Gln Cys Asp Gln Gln Thr Thr His

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acc tgg ggt caa tac tca ccc ttc ttc tct gtc ccg tca gag atc tcc 249  
Thr Trp Gly Gln Tyr Ser Pro Phe Phe Ser Val Pro Ser Glu Ile Ser

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cct tcc gtt cct gat ggc tgc cgc ctc acc ttc gcc caa gtt ctc tcc 297  
Pro Ser Val Pro Asp Gly Cys Arg Leu Thr Phe Ala Gln Val Leu Ser

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cgc cac ggc gcc cgc ttc cca acc ccg ggt aaa gcc gcc gcc atc tcc 345  
Arg His Gly Ala Arg Phe Pro Thr Pro Gly Lys Ala Ala Ala Ile Ser

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gct gtc ctc acc aaa atc aaa acc tct gcc acc tgg tac ggt tcc gac 393  
Ala Val Leu Thr Lys Ile Lys Thr Ser Ala Thr Trp Tyr Gly Ser Asp

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ttt cag ttc atc aag aac tac gac tat gta ctt ggc gta gac cac ctg 441  
Phe Gln Phe Ile Lys Asn Tyr Asp Tyr Val Leu Gly Val Asp His Leu

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acc gcg ttc ggc gag caa gaa atg gtc aac tcc ggc atc aag ttc tac 489  
Thr Ala Phe Gly Glu Gln Glu Met Val Asn Ser Gly Ile Lys Phe Tyr

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cag cgc tac tcc tcc ctc atc cag aca gaa gac tcg gat acg ctc ccc 537  
Gln Arg Tyr Ser Ser Leu Ile Gln Thr Glu Asp Ser Asp Thr Leu Pro

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Phe Val Arg Ala Ser Gly Gln Glu Arg Val Ile Ala Ser Ala Glu Asn

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ttc acc acc ggc ttc tac tcg gcc ctc tca gcc gac aag aac cct cct 633  
Phe Thr Thr Gly Phe Tyr Ser Ala Leu Ser Ala Asp Lys Asn Pro Pro

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170

tcc tcc tta cca aga cca gaa atg gtc atc att tct gag gag cca aca	681
Ser Ser Leu Pro Arg Pro Glu Met Val Ile Ile Ser Glu Glu Pro Thr	
175 180 185	
gcc aac aac acc atg cac cac ggc ctc tgc cgc tcc ttt gaa gat tcc	729
Ala Asn Asn Thr Met His His Gly Leu Cys Arg Ser Phe Glu Asp Ser	
190 195 200	
acc acc ggc gac caa gcc caa gcg gaa ttc atc gcc gcc acc ttc cca	777
Thr Thr Gly Asp Gln Ala Gln Ala Glu Phe Ile Ala Ala Thr Phe Pro	
205 210 215	
ccc atc acc gcc cgt ctc aac gcc caa ggt ttc aaa ggc gtc acc ctc	825
Pro Ile Thr Ala Arg Leu Asn Ala Gln Gly Phe Lys Gly Val Thr Leu	
220 225 230 235	
tcc aac acc gac gtc cta tca cta atg gac ctc tgc ccc ttt gac acc	873
Ser Asn Thr Asp Val Leu Ser Leu Met Asp Leu Cys Pro Phe Asp Thr	
240 245 250	
gtc gcc tac ccc ctt tcc tcc ctc acc acc acc tct tcc gtt tct gga	921
Val Ala Tyr Pro Leu Ser Ser Leu Thr Thr Thr Ser Ser Val Ser Gly	
255 260 265	
ggc ggc aag tta tcc ccc ttc tgc tct ctt ttc act gcc agc gac tgg	969
Gly Gly Lys Leu Ser Pro Phe Cys Ser Leu Phe Thr Ala Ser Asp Trp	
270 275 280	
aca atc tac gat tac ctc cag tcc cta ggg aaa tac tac ggt ttc ggc	1017
Thr Ile Tyr Asp Tyr Leu Gln Ser Leu Gly Lys Tyr Tyr Gly Phe Gly	
285 290 295	
ccc ggt aat tcc cta gct gcc acc cag ggg gta ggg tac gtc aac gag	1065
Pro Gly Asn Ser Leu Ala Ala Thr Gln Gly Val Gly Tyr Val Asn Glu	
300 305 310 315	
ctt atc gcc cgc ttg atc cgt gct ccc gtc gta gat cac acg acg acc	1113
Leu Ile Ala Arg Leu Ile Arg Ala Pro Val Val Asp His Thr Thr Thr	
320 325 330	
aac tct act ctt gat ggc gac gaa aaa acg ttt ccg ttg aac aga acg	1161
Asn Ser Thr Leu Asp Gly Asp Glu Lys Thr Phe Pro Leu Asn Arg Thr	
335 340 345	
gtg tat gcg gat ttt tcc cat gat aat gat atg atg aat atc ctg act	1209
Val Tyr Ala Asp Phe Ser His Asp Asn Asp Met Met Asn Ile Leu Thr	
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gct ttg cgg ata ttc gag cat atc agt ccg atg gat aac acc act atc	1257
Ala Leu Arg Ile Phe Glu His Ile Ser Pro Met Asp Asn Thr Thr Ile	
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ccg acc aac tat ggc cag aca gga gat gac ggg gtg aag gaa agg gat	1305
Pro Thr Asn Tyr Gly Gln Thr Gly Asp Asp Gly Val Lys Glu Arg Asp	
380 385 390 395	
ttg ttc aag gtt agt tgg gcg gtg ccc ttt gct ggg agg gtg tac ttt	1353

Leu Phe Lys Val Ser Trp Ala Val Pro Phe Ala Gly Arg Val Tyr Phe	
400 405 410	
gag aaa atg gtt tgt gat gcg gat ggg gat ggc aag att gat agt gat	1401
Glu Lys Met Val Cys Asp Ala Asp Gly Asp Gly Lys Ile Asp Ser Asp	
415 420 425	
gag gct cag aaa gag ttg gtg agg att ttg gtt aat gat cgg gtg atg	1449
Glu Ala Gln Lys Glu Leu Val Arg Ile Leu Val Asn Asp Arg Val Met	
430 435 440	
aga ttg aat ggg tgt gat gct gat gaa cag ggt agg tgt gga ttg gag	1497
Arg Leu Asn Gly Cys Asp Ala Asp Glu Gln Gly Arg Cys Gly Leu Glu	
445 450 455	
aag ttt gtg gag agt atg gag ttt gcg agg aga ggg ggg gag tgg gag	1545
Lys Phe Val Glu Ser Met Glu Phe Ala Arg Arg Gly Gly Glu Trp Glu	
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Glu Arg Cys Phe Val *	
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Gly Tyr Gln Cys Asp Gln Gln Thr Thr His Thr Trp Gly Gln Tyr Ser	
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Pro Phe Phe Ser Val Pro Ser Glu Ile Ser Pro Ser Val Pro Asp Gly	
50 55 60	
Cys Arg Leu Thr Phe Ala Gln Val Leu Ser Arg His Gly Ala Arg Phe	
65 70 75 80	
Pro Thr Pro Gly Lys Ala Ala Ala Ile Ser Ala Val Leu Thr Lys Ile	
85 90 95	
Lys Thr Ser Ala Thr Trp Tyr Gly Ser Asp Phe Gln Phe Ile Lys Asn	
100 105 110	
Tyr Asp Tyr Val Leu Gly Val Asp His Leu Thr Ala Phe Gly Glu Gln	
115 120 125	
Glu Met Val Asn Ser Gly Ile Lys Phe Tyr Gln Arg Tyr Ser Ser Leu	
130 135 140	
Ile Gln Thr Glu Asp Ser Asp Thr Leu Pro Phe Val Arg Ala Ser Gly	
145 150 155 160	
Gln Glu Arg Val Ile Ala Ser Ala Glu Asn Phe Thr Thr Gly Phe Tyr	
165 170 175	
Ser Ala Leu Ser Ala Asp Lys Asn Pro Pro Ser Ser Leu Pro Arg Pro	

			180					185				190				
Glu	Met	Val	Ile	Ile	Ser	Glu	Glu	Pro	Thr	Ala	Asn	Asn	Thr	Met	His	
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His	Gly	Leu	Cys	Arg	Ser	Phe	Glu	Asp	Ser	Thr	Thr	Gly	Asp	Gln	Ala	
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Gln	Ala	Glu	Phe	Ile	Ala	Ala	Thr	Phe	Pro	Pro	Ile	Thr	Ala	Arg	Leu	
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Asn	Ala	Gln	Gly	Phe	Lys	Gly	Val	Thr	Leu	Ser	Asn	Thr	Asp	Val	Leu	
			245						250					255		
Ser	Leu	Met	Asp	Leu	Cys	Pro	Phe	Asp	Thr	Val	Ala	Tyr	Pro	Leu	Ser	
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Ser	Leu	Thr	Thr	Thr	Ser	Ser	Val	Ser	Gly	Gly	Gly	Lys	Leu	Ser	Pro	
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Phe	Cys	Ser	Leu	Phe	Thr	Ala	Ser	Asp	Trp	Thr	Ile	Tyr	Asp	Tyr	Leu	
290						295					300					
Gln	Ser	Leu	Gly	Lys	Tyr	Tyr	Gly	Phe	Gly	Pro	Gly	Asn	Ser	Leu	Ala	
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Ala	Thr	Gln	Gly	Val	Gly	Tyr	Val	Asn	Glu	Leu	Ile	Ala	Arg	Leu	Ile	
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Arg	Ala	Pro	Val	Val	Asp	His	Thr	Thr	Thr	Asn	Ser	Thr	Leu	Asp	Gly	
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Asp	Glu	Lys	Thr	Phe	Pro	Leu	Asn	Arg	Thr	Val	Tyr	Ala	Asp	Phe	Ser	
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His	Asp	Asn	Asp	Met	Met	Asn	Ile	Leu	Thr	Ala	Leu	Arg	Ile	Phe	Glu	
370						375					380					
His	Ile	Ser	Pro	Met	Asp	Asn	Thr	Thr	Ile	Pro	Thr	Asn	Tyr	Gly	Gln	
385					390					395					400	
Thr	Gly	Asp	Asp	Gly	Val	Lys	Glu	Arg	Asp	Leu	Phe	Lys	Val	Ser	Trp	
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Ala	Val	Pro	Phe	Ala	Gly	Arg	Val	Tyr	Phe	Glu	Lys	Met	Val	Cys	Asp	
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Ala	Asp	Gly	Asp	Gly	Lys	Ile	Asp	Ser	Asp	Glu	Ala	Gln	Lys	Glu	Leu	
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Val	Arg	Ile	Leu	Val	Asn	Asp	Arg	Val	Met	Arg	Leu	Asn	Gly	Cys	Asp	
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Ala	Asp	Glu	Gln	Gly	Arg	Cys	Gly	Leu	Glu	Lys	Phe	Val	Glu	Ser	Met	
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<212> PRT

<213> Paxillus involtus

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Tyr	Gln	Cys	Asp	Gln	Gln	Thr	Thr	His	Thr	Trp	Gly	Gln	Tyr	Ser	Pro	
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Phe	Phe	Ser	Val	Pro	Ser	Glu	Ile	Ser	Pro	Ser	Val	Pro	Asp	Gly	Cys	
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Arg	Leu	Thr	Phe	Ala	Gln	Val	Leu	Ser	Arg	His	Gly	Ala	Arg	Phe	Pro	
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Thr	Pro	Gly	Lys	Ala	Ala	Ala	Ile	Ser	Ala	Val	Leu	Thr	Lys	Ile	Lys	
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Thr	Ser	Ala	Thr	Trp	Tyr	Gly	Ser	Asp	Phe	Gln	Phe	Ile	Lys	Asn	Tyr	



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Pro	Glu	Ser	Glu	Gln	Arg	Asn
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Leu	Ala	Glu	Tyr	Lys	Ala	Pro
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Asn	Ile	Ile	Gln	Arg	His	Gly
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Thr	Arg	Ile	Lys	Ala	Gly	Leu
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Thr	Asp	Pro	Lys	Phe	Asp	Phe
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Thr	Ser	Asp	Leu	Val	Pro	Phe
		115				120
Leu	Glu	Val	Phe	Ala	Arg	Tyr
		130				135
Pro	Phe	Ile	Arg	Ser	Asp	Gly
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Asn	Trp	Thr	Ala	Gly	Phe	Ala
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Lys	Leu	Asp	Leu	Ile	Leu	Pro
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Asn	Met	Cys	Pro	Ala	Ala	Gly
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Leu	Ala	Ser	Ala	Phe	Pro	Ser
		210				215
Pro	Gly	Ala	Asn	Leu	Thr	Asp
		225				230
Cys	Pro	Phe	Met	Thr	Val	Ser
			245			250
Leu	Phe	Glu	Gly	Ile	Pro	Gly
		260				265
Asp	Leu	Asp	Lys	Phe	Tyr	Gly
		275				280
Val	Gln	Gly	Val	Gly	Tyr	Ile
		290				295
Ser	Ala	Val	Asn	Asp	Asn	Thr
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Pro	Asp	Thr	Phe	Pro	Leu	Asn
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Asp	Asn	Leu	Met	Val	Ala	Val
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Ser	Ala	Pro	Leu	Ser	Thr	Ser
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Thr	Ser	Ser	Val	Val	Pro	Phe
		370				375
Ser	Cys	Ala	Gly	Thr	Thr	Lys
		385				390
Gln	Pro	Leu	Glu	Phe	Cys	Gly
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Asp	Lys	Phe	Val	Glu	Ser	Gln
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Asp	Phe	Glu	Lys	Cys	Leu	Ala
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Cys	Leu	Asp	Val	Thr	Arg	Asp	Val	Gln	Gln	Ser	Trp	Ser	Met	Tyr	Ser
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Pro	Tyr	Phe	Pro	Ala	Ala	Thr	Tyr	Val	Ala	Pro	Pro	Ala	Ser	Cys	Gln
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Ile	Asn	Gln	Val	His	Ile	Ile	Gln	Arg	His	Gly	Ala	Arg	Phe	Pro	Thr
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Ser	Gly	Ala	Ala	Lys	Arg	Ile	Gln	Thr	Ala	Val	Ala	Lys	Leu	Lys	Ala
				85					90					95	
Ala	Ser	Asn	Tyr	Thr	Asp	Pro	Leu	Leu	Ala	Phe	Val	Thr	Asn	Tyr	Thr
			100					105					110		
Tyr	Ser	Leu	Gly	Gln	Asp	Ser	Leu	Val	Glu	Leu	Gly	Ala	Thr	Gln	Ser
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Ser	Glu	Ala	Gly	Gln	Glu	Ala	Phe	Thr	Arg	Tyr	Ser	Ser	Leu	Val	Ser
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Ala	Asp	Glu	Leu	Pro	Phe	Val	Arg	Ala	Ser	Gly	Ser	Asp	Arg	Val	Val
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Ala	Thr	Ala	Asn	Asn	Trp	Thr	Ala	Gly	Phe	Ala	Leu	Ala	Ser	Ser	Asn
			165					170						175	
Ser	Ile	Thr	Pro	Val	Leu	Ser	Val	Ile	Ile	Ser	Glu	Ala	Gly	Asn	Asp
		180					185						190		
Thr	Leu	Asp	Asp	Asn	Met	Cys	Pro	Ala	Ala	Gly	Asp	Ser	Asp	Pro	Gln
	195						200					205			
Val	Asn	Gln	Trp	Leu	Ala	Gln	Phe	Ala	Pro	Pro	Met	Thr	Ala	Arg	Leu
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Leu	Leu	Thr	Leu	Cys	Pro	Phe	Glu	Thr	Val	Ala	Thr	Glu	Arg	Arg	Ser
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Glu	Phe	Cys	Asp	Ile	Tyr	Glu	Glu	Leu	Gln	Ala	Glu	Asp	Ala	Phe	Ala
			260				265						270		
Tyr	Asn	Ala	Asp	Leu	Asp	Lys	Phe	Tyr	Gly	Thr	Gly	Tyr	Gly	Gln	Pro
	275						280					285			
Leu	Gly	Pro	Val	Gln	Gly	Val	Gly	Tyr	Ile	Asn	Glu	Leu	Ile	Ala	Arg
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Leu	Thr	Ala	Gln	Asn	Val	Ser	Asp	His	Thr	Gln	Thr	Asn	Ser	Thr	Leu
305					310					315					320
Asp	Ser	Ser	Pro	Glu	Thr	Phe	Pro	Leu	Asn	Arg	Thr	Leu	Tyr	Ala	Asp
			325						330					335	
Phe	Ser	His	Asp	Asn	Gln	Met	Val	Ala	Ile	Phe	Ser	Ala	Met	Gly	Leu
			340					345					350		
Phe	Asn	Gln	Ser	Ala	Pro	Leu	Asp	Pro	Thr	Thr	Pro	Asp	Pro	Ala	Arg
	355						360					365			
Thr	Phe	Leu	Val	Lys	Lys	Ile	Val	Pro	Phe	Ser	Ala	Arg	Met	Val	Val
	370					375					380				
Glu	Arg	Leu	Asp	Cys	Gly	Gly	Ala	Gln	Ser	Val	Arg	Leu	Leu	Val	Asn
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Asp	Ala	Val	Gln	Pro	Leu	Ala	Phe	Cys	Gly	Ala	Asp	Thr	Ser	Gly	Val
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Cys Thr Leu Asp Ala Phe Val Glu Ser Gln Ala Tyr Ala Arg Asn Asp  
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Gly Glu Gly Asp Phe Glu Lys Cys Phe Ala Thr  
435 440

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<212> PRT  
<213> A grocybe pediades

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Pro Gln Ile Gln Asp Ser Trp Ala Ala Tyr Thr Pro Tyr Tyr Pro Val  
35 40 45  
Gln Ala Tyr Thr Pro Pro Pro Lys Asp Cys Lys Ile Thr Gln Val Asn  
50 55 60  
Ile Ile Gln Arg His Gly Ala Arg Phe Pro Thr Ser Gly Ala Gly Thr  
65 70 75 80  
Arg Ile Gln Ala Ala Val Lys Lys Leu Gln Ser Ala Lys Thr Tyr Thr  
85 90 95  
Asp Pro Arg Leu Asp Phe Leu Thr Asn Tyr Thr Tyr Thr Leu Gly His  
100 105 110  
Asp Asp Leu Val Pro Phe Gly Ala Leu Gln Ser Ser Gln Ala Gly Glu  
115 120 125  
Glu Thr Phe Gln Arg Tyr Ser Phe Leu Val Ser Lys Glu Asn Leu Pro  
130 135 140  
Phe Val Arg Ala Ser Ser Ser Asn Arg Val Val Asp Ser Ala Thr Asn  
145 150 155 160  
Trp Thr Glu Gly Phe Ser Ala Ala Ser His His Val Leu Asn Pro Ile  
165 170 175  
Leu Phe Val Ile Leu Ser Glu Ser Leu Asn Asp Thr Leu Asp Asp Ala  
180 185 190  
Met Cys Pro Asn Ala Gly Ser Ser Asp Pro Gln Thr Gly Ile Trp Thr  
195 200 205  
Ser Ile Tyr Gly Thr Pro Ile Ala Asn Arg Leu Asn Gln Gln Ala Pro  
210 215 220  
Gly Ala Asn Ile Thr Ala Ala Asp Val Ser Asn Leu Ile Pro Leu Cys  
225 230 235 240  
Ala Phe Glu Thr Ile Val Lys Glu Thr Pro Ser Pro Phe Cys Asn Leu  
245 250 255  
Phe Thr Pro Glu Glu Phe Ala Gln Phe Glu Tyr Phe Gly Asp Leu Asp  
260 265 270  
Lys Phe Tyr Gly Thr Gly Tyr Gly Gln Pro Leu Gly Pro Val Gln Gly  
275 280 285  
Val Gly Tyr Ile Asn Glu Leu Leu Ala Arg Leu Thr Glu Met Pro Val  
290 295 300  
Arg Asp Asn Thr Gln Thr Asn Arg Thr Leu Asp Ser Ser Pro Leu Thr  
305 310 315 320  
Phe Pro Leu Asp Arg Ser Ile Tyr Ala Asp Leu Ser His Asp Asn Gln  
325 330 335  
Met Ile Ala Ile Phe Ser Ala Met Gly Leu Phe Asn Gln Ser Ser Pro  
340 345 350  
Leu Asp Pro Ser Phe Pro Asn Pro Lys Arg Thr Trp Val Thr Ser Arg  
355 360 365

Leu Thr Pro Phe Ser Ala Arg Met Val Thr Glu Arg Leu Leu Cys Gln  
 370 375 380  
 Arg Asp Gly Thr Gly Ser Gly Gly Pro Ser Arg Ile Met Arg Asn Gly  
 385 390 395 400  
 Asn Val Gln Thr Phe Val Arg Ile Leu Val Asn Asp Ala Leu Gln Pro  
 405 410 415  
 Leu Lys Phe Cys Gly Gly Asp Met Asp Ser Leu Cys Thr Leu Glu Ala  
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 Phe Val Glu Ser Gln Lys Tyr Ala Arg Glu Asp Gly Gln Gly Asp Phe  
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 Glu Lys Cys Phe Asp  
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<211> 439

<212> PRT

<213> Peniophora ycii

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 Ile Pro Ala Gln Asn Thr Ser Asn Trp Gly Pro Tyr Asp Pro Phe Phe  
 35 40 45  
 Pro Val Glu Pro Tyr Ala Ala Pro Pro Glu Gly Cys Thr Val Thr Gln  
 50 55 60  
 Val Asn Leu Ile Gln Arg His Gly Ala Arg Trp Pro Thr Ser Gly Ala  
 65 70 75 80  
 Arg Ser Arg Gln Val Ala Ala Val Ala Lys Ile Gln Met Ala Arg Pro  
 85 90 95  
 Phe Thr Asp Pro Lys Tyr Glu Phe Leu Asn Asp Phe Val Tyr Lys Phe  
 100 105 110  
 Gly Val Ala Asp Leu Leu Pro Phe Gly Ala Asn Gln Ser His Gln Thr  
 115 120 125  
 Gly Thr Asp Met Tyr Thr Arg Tyr Ser Thr Leu Phe Glu Gly Gly Asp  
 130 135 140  
 Val Pro Phe Val Arg Ala Ala Gly Asp Gln Arg Val Val Asp Ser Ser  
 145 150 155 160  
 Thr Asn Trp Thr Ala Gly Phe Gly Asp Ala Ser Gly Glu Thr Val Leu  
 165 170 175  
 Pro Thr Leu Gln Val Val Leu Gln Glu Glu Gly Asn Cys Thr Leu Cys  
 180 185 190  
 Asn Asn Met Cys Pro Asn Glu Val Asp Gly Asp Glu Ser Thr Thr Trp  
 195 200 205  
 Leu Gly Val Phe Ala Pro Asn Ile Thr Ala Arg Leu Asn Ala Ala Ala  
 210 215 220  
 Pro Ser Ala Asn Leu Ser Asp Ser Asp Ala Leu Thr Leu Met Asp Met  
 225 230 235 240  
 Cys Pro Phe Asp Thr Leu Ser Ser Gly Asn Ala Ser Pro Phe Cys Asp  
 245 250 255  
 Leu Phe Thr Ala Glu Glu Tyr Val Ser Tyr Glu Tyr Tyr Tyr Asp Leu  
 260 265 270  
 Asp Lys Tyr Tyr Gly Thr Gly Pro Gly Asn Ala Leu Gly Pro Val Gln  
 275 280 285  
 Gly Val Gly Tyr Val Asn Glu Leu Leu Ala Arg Leu Thr Gly Gln Ala  
 290 295 300

Val Arg Asp Glu Thr Gln Thr Asn Arg Thr Leu Asp Ser Asp Pro Ala  
 305 310 315 320  
 Thr Phe Pro Leu Asn Arg Thr Phe Tyr Ala Asp Phe Ser His Asp Asn  
 325 330 335  
 Thr Met Val Pro Ile Phe Ala Ala Leu Gly Leu Phe Asn Ala Thr Ala  
 340 345 350  
 Leu Asp Pro Leu Lys Pro Asp Glu Asn Arg Leu Trp Val Asp Ser Lys  
 355 360 365  
 Leu Val Pro Phe Ser Gly His Met Thr Val Glu Lys Leu Ala Cys Ser  
 370 375 380  
 Gly Lys Glu Ala Val Arg Val Leu Val Asn Asp Ala Val Gln Pro Leu  
 385 390 395 400  
 Glu Phe Cys Gly Gly Val Asp Gly Val Cys Glu Leu Ser Ala Phe Val  
 405 410 415  
 Glu Ser Gln Thr Tyr Ala Arg Glu Asn Gly Gln Gly Asp Phe Ala Lys  
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 Cys Gly Phe Val Pro Ser Glu  
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<211> 465

<212> PRT

<213> *Aspergillus fumigatus*

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Met Val Thr Leu Thr Phe Leu Leu Ser Ala Ala Tyr Leu Leu Ser Gly  
 1 5 10 15  
 Arg Val Ser Ala Ala Pro Ser Ser Ala Gly Ser Lys Ser Cys Asp Thr  
 20 25 30  
 Val Asp Leu Gly Tyr Gln Cys Ser Pro Ala Thr Ser His Leu Trp Gly  
 35 40 45  
 Gln Tyr Ser Pro Phe Phe Ser Leu Glu Asp Glu Leu Ser Val Ser Ser  
 50 55 60  
 Lys Leu Pro Lys Asp Cys Arg Ile Thr Leu Val Gln Val Leu Ser Arg  
 65 70 75 80  
 His Gly Ala Arg Tyr Pro Thr Ser Ser Lys Ser Lys Lys Tyr Lys Lys  
 85 90 95  
 Leu Val Thr Ala Ile Gln Ala Asn Ala Thr Asp Phe Lys Gly Lys Phe  
 100 105 110  
 Ala Phe Leu Lys Thr Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu Thr  
 115 120 125  
 Pro Phe Gly Glu Gln Gln Leu Val Asn Ser Gly Ile Lys Phe Tyr Gln  
 130 135 140  
 Arg Tyr Lys Ala Leu Ala Arg Ser Val Val Pro Phe Ile Arg Ala Ser  
 145 150 155 160  
 Gly Ser Asp Arg Val Ile Ala Ser Gly Glu Lys Phe Ile Glu Gly Phe  
 165 170 175  
 Gln Gln Ala Lys Leu Ala Asp Pro Gly Ala Thr Asn Arg Ala Ala Pro  
 180 185 190  
 Ala Ile Ser Val Ile Ile Pro Glu Ser Glu Thr Phe Asn Asn Thr Leu  
 195 200 205  
 Asp His Gly Val Cys Thr Lys Phe Glu Ala Ser Gln Leu Gly Asp Glu  
 210 215 220  
 Val Ala Ala Asn Phe Thr Ala Leu Phe Ala Pro Asp Ile Arg Ala Arg  
 225 230 235 240  
 Ala Glu Lys His Leu Pro Gly Val Thr Leu Thr Asp Glu Asp Val Val  
 245 250 255

Ser	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Val	Ala	Arg	Thr	Ser	Asp
			260					265					270		
Ala	Ser	Gln	Leu	Ser	Pro	Phe	Cys	Gln	Leu	Phe	Thr	His	Asn	Glu	Trp
		275					280					285			
Lys	Lys	Tyr	Asn	Tyr	Leu	Gln	Ser	Leu	Gly	Lys	Tyr	Tyr	Gly	Tyr	Gly
	290					295					300				
Ala	Gly	Asn	Pro	Leu	Gly	Pro	Ala	Gln	Gly	Ile	Gly	Phe	Thr	Asn	Glu
305					310					315					320
Leu	Ile	Ala	Arg	Leu	Thr	Arg	Ser	Pro	Val	Gln	Asp	His	Thr	Ser	Thr
			325						330					335	
Asn	Ser	Thr	Leu	Val	Ser	Asn	Pro	Ala	Thr	Phe	Pro	Leu	Asn	Ala	Thr
		340						345					350		
Met	Tyr	Val	Asp	Phe	Ser	His	Asp	Asn	Ser	Met	Val	Ser	Ile	Phe	Phe
	355						360					365			
Ala	Leu	Gly	Leu	Tyr	Asn	Gly	Thr	Glu	Pro	Leu	Ser	Arg	Thr	Ser	Val
	370					375					380				
Glu	Ser	Ala	Lys	Glu	Leu	Asp	Gly	Tyr	Ser	Ala	Ser	Trp	Val	Val	Pro
385					390					395					400
Phe	Gly	Ala	Arg	Ala	Tyr	Phe	Glu	Thr	Met	Gln	Cys	Lys	Ser	Glu	Lys
			405					410						415	
Glu	Pro	Leu	Val	Arg	Ala	Leu	Ile	Asn	Asp	Arg	Val	Val	Pro	Leu	His
			420					425					430		
Gly	Cys	Asp	Val	Asp	Lys	Leu	Gly	Arg	Cys	Lys	Leu	Asn	Asp	Phe	Val
	435						440					445			
Lys	Gly	Leu	Ser	Trp	Ala	Arg	Ser	Gly	Gly	Asn	Trp	Gly	Glu	Cys	Phe
	450					455					460				

Ser

465

<210> 9

<211> 467

<212> PRT

<213> Artificial Sequence

<220>

<223> Variation

<400> 9

Met	Gly	Val	Phe	Val	Val	Leu	Leu	Ser	Ile	Ala	Thr	Leu	Phe	Gly	Ser
1				5					10					15	
Thr	Ser	Gly	Thr	Ala	Leu	Gly	Pro	Arg	Gly	Asn	Ser	His	Ser	Cys	Asp
		20						25					30		
Thr	Val	Asp	Gly	Gly	Tyr	Gln	Cys	Phe	Pro	Glu	Ile	Ser	His	Leu	Trp
		35				40						45			
Gly	Gln	Tyr	Ser	Pro	Tyr	Phe	Ser	Leu	Glu	Asp	Glu	Ser	Ala	Ile	Ser
	50					55				60					
Pro	Asp	Val	Pro	Asp	Asp	Cys	Arg	Val	Thr	Phe	Val	Gln	Val	Leu	Ser
65				70						75					80
Arg	His	Gly	Ala	Arg	Tyr	Pro	Thr	Ser	Ser	Lys	Ser	Lys	Ala	Tyr	Ser
			85					90						95	
Ala	Leu	Ile	Glu	Ala	Ile	Gln	Lys	Asn	Ala	Thr	Ala	Phe	Lys	Gly	Lys
		100						105					110		
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Thr	Leu	Gly	Ala	Asp	Asp	Leu
	115						120					125			
Thr	Pro	Phe	Gly	Glu	Asn	Gln	Met	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr
	130					135					140				
Arg	Arg	Tyr	Lys	Ala	Leu	Ala	Arg	Lys	Ile	Val	Pro	Phe	Ile	Arg	Ala

145					150					155				160
Ser	Gly	Ser	Asp	Arg	Val	Ile	Ala	Ser	Ala	Glu	Lys	Phe	Ile	Glu Gly
				165					170					175
Phe	Gln	Ser	Ala	Lys	Leu	Ala	Asp	Pro	Gly	Ser	Gln	Pro	His	Gln Ala
			180					185					190	
Ser	Pro	Val	Ile	Asp	Val	Ile	Ile	Pro	Glu	Gly	Ser	Gly	Tyr	Asn Asn
		195					200					205		
Thr	Leu	Asp	His	Gly	Thr	Cys	Thr	Ala	Phe	Glu	Asp	Ser	Glu	Leu Gly
	210					215					220			
Asp	Asp	Val	Glu	Ala	Asn	Phe	Thr	Ala	Leu	Phe	Ala	Pro	Ala	Ile Arg
225					230					235				240
Ala	Arg	Leu	Glu	Ala	Asp	Leu	Pro	Gly	Val	Thr	Leu	Thr	Asp	Glu Asp
				245					250					255
Val	Val	Tyr	Leu	Met	Asp	Met	Cys	Pro	Phe	Glu	Thr	Val	Ala	Arg Thr
		260						265					270	
Ser	Asp	Ala	Thr	Glu	Leu	Ser	Pro	Phe	Cys	Ala	Leu	Phe	Thr	His Asp
	275						280					285		
Glu	Trp	Arg	Gln	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Gly	Lys	Tyr	Tyr Gly
	290					295					300			
Tyr	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Ala	Gln	Gly	Val	Gly	Phe Ala
305				310						315				320
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	Arg	Ser	Pro	Val	Gln	Asp	His Thr
				325					330					335
Ser	Thr	Asn	His	Thr	Leu	Asp	Ser	Asn	Pro	Ala	Thr	Phe	Pro	Leu Asn
		340						345					350	
Ala	Thr	Leu	Tyr	Ala	Asp	Phe	Ser	His	Asp	Asn	Ser	Met	Ile	Ser Ile
	355					360						365		
Phe	Phe	Ala	Leu	Gly	Leu	Tyr	Asn	Gly	Thr	Ala	Pro	Leu	Ser	Thr Thr
	370					375					380			
Ser	Val	Glu	Ser	Ile	Glu	Glu	Thr	Asp	Gly	Tyr	Ser	Ala	Ser	Trp Thr
385					390					395				400
Val	Pro	Phe	Gly	Ala	Arg	Ala	Tyr	Val	Glu	Met	Met	Gln	Cys	Gln Ala
				405					410					415
Glu	Lys	Glu	Pro	Leu	Val	Arg	Val	Leu	Val	Asn	Asp	Arg	Val	Val Pro
			420				425						430	
Leu	His	Gly	Cys	Ala	Val	Asp	Lys	Leu	Gly	Arg	Cys	Lys	Arg	Asp Asp
	435					440					445			
Phe	Val	Glu	Gly	Leu	Ser	Phe	Ala	Arg	Ser	Gly	Gly	Asn	Trp	Ala Glu
	450					455					460			
Cys	Phe	Ala												
465														

<210> 10

<211> 463

<212> PRT

<213> Aspergillus nidulans

<400> 10

Met	Ala	Phe	Phe	Thr	Val	Ala	Leu	Ser	Leu	Tyr	Tyr	Leu	Leu	Ser	Arg
1				5					10					15	
Val	Ser	Ala	Gln	Ala	Pro	Val	Val	Gln	Asn	His	Ser	Cys	Asn	Thr	Ala
			20					25					30		
Asp	Gly	Gly	Tyr	Gln	Cys	Phe	Pro	Asn	Val	Ser	His	Val	Trp	Gly	Gln
	35						40					45			
Tyr	Ser	Pro	Tyr	Phe	Ser	Ile	Glu	Gln	Glu	Ser	Ala	Ile	Ser	Glu	Asp
	50					55					60				
Val	Pro	His	Gly	Cys	Glu	Val	Thr	Phe	Val	Gln	Val	Leu	Ser	Arg	His

65					70					75					80
Gly	Ala	Arg	Tyr	Pro	Thr	Glu	Ser	Lys	Ser	Lys	Ala	Tyr	Ser	Gly	Leu
				85					90					95	
Ile	Glu	Ala	Ile	Gln	Lys	Asn	Ala	Thr	Ser	Phe	Trp	Gly	Gln	Tyr	Ala
			100					105					110		
Phe	Leu	Glu	Ser	Tyr	Asn	Tyr	Thr	Leu	Gly	Ala	Asp	Asp	Leu	Thr	Ile
		115					120					125			
Phe	Gly	Glu	Asn	Gln	Met	Val	Asp	Ser	Gly	Ala	Lys	Phe	Tyr	Arg	Arg
	130				135						140				
Tyr	Lys	Asn	Leu	Ala	Arg	Lys	Asn	Thr	Pro	Phe	Ile	Arg	Ala	Ser	Gly
145					150					155					160
Ser	Asp	Arg	Val	Val	Ala	Ser	Ala	Glu	Lys	Phe	Ile	Asn	Gly	Phe	Arg
			165						170					175	
Lys	Ala	Gln	Leu	His	Asp	His	Gly	Ser	Lys	Arg	Ala	Thr	Pro	Val	Val
		180					185						190		
Asn	Val	Ile	Ile	Pro	Glu	Ile	Asp	Gly	Phe	Asn	Asn	Thr	Leu	Asp	His
	195						200					205			
Ser	Thr	Cys	Val	Ser	Phe	Glu	Asn	Asp	Glu	Arg	Ala	Asp	Glu	Ile	Glu
	210					215					220				
Ala	Asn	Phe	Thr	Ala	Ile	Met	Gly	Pro	Pro	Ile	Arg	Lys	Arg	Leu	Glu
225					230					235					240
Asn	Asp	Leu	Pro	Gly	Ile	Lys	Leu	Thr	Asn	Glu	Asn	Val	Ile	Tyr	Leu
			245						250					255	
Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Met	Ala	Arg	Thr	Ala	His	Gly	Thr
		260					265					270			
Glu	Leu	Ser	Pro	Phe	Cys	Ala	Ile	Phe	Thr	Glu	Lys	Glu	Trp	Leu	Gln
	275						280					285			
Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Ser	Lys	Tyr	Tyr	Gly	Tyr	Gly	Ala	Gly
	290				295						300				
Ser	Pro	Leu	Gly	Pro	Ala	Gln	Gly	Ile	Gly	Phe	Thr	Asn	Glu	Leu	Ile
305					310					315					320
Ala	Arg	Leu	Thr	Gln	Ser	Pro	Val	Gln	Asp	Asn	Thr	Ser	Thr	Asn	His
			325						330					335	
Thr	Leu	Asp	Ser	Asn	Pro	Ala	Thr	Phe	Pro	Leu	Asp	Arg	Lys	Leu	Tyr
		340					345						350		
Ala	Asp	Phe	Ser	His	Asp	Asn	Ser	Met	Ile	Ser	Ile	Phe	Phe	Ala	Met
	355					360						365			
Gly	Leu	Tyr	Asn	Gly	Thr	Gln	Pro	Leu	Ser	Met	Asp	Ser	Val	Glu	Ser
	370				375						380				
Ile	Gln	Glu	Met	Asp	Gly	Tyr	Ala	Ala	Ser	Trp	Thr	Val	Pro	Phe	Gly
385				390						395					400
Ala	Arg	Ala	Tyr	Phe	Glu	Leu	Met	Gln	Cys	Glu	Lys	Lys	Glu	Pro	Leu
			405					410						415	
Val	Arg	Val	Leu	Val	Asn	Asp	Arg	Val	Val	Pro	Leu	His	Gly	Cys	Ala
		420					425						430		
Val	Asp	Lys	Phe	Gly	Arg	Cys	Thr	Leu	Asp	Asp	Trp	Val	Glu	Gly	Leu
	435					440					445				
Asn	Phe	Ala	Arg	Ser	Gly	Gly	Asn	Trp	Lys	Thr	Cys	Phe	Thr	Leu	
	450				455						460				

<210> 11

<211> 467

<212> PRT

<213> Aspergillus ficuum

<400> 11

Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val

1				5				10					15			
Thr	Ser	Gly	Leu	Ala	Val	Pro	Ala	Ser	Arg	Asn	Gln	Ser	Ser	Cys	Asp	
			20					25					30			
Thr	Val	Asp	Gln	Gly	Tyr	Gln	Cys	Phe	Ser	Glu	Thr	Ser	His	Leu	Trp	
		35					40					45				
Gly	Gln	Tyr	Ala	Pro	Phe	Phe	Ser	Leu	Ala	Asn	Glu	Ser	Val	Ile	Ser	
	50					55					60					
Pro	Glu	Val	Pro	Ala	Gly	Cys	Arg	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	
65					70					75				80		
Arg	His	Gly	Ala	Arg	Tyr	Pro	Thr	Asp	Ser	Lys	Gly	Lys	Lys	Tyr	Ser	
				85				90						95		
Ala	Leu	Ile	Glu	Glu	Ile	Gln	Gln	Asn	Ala	Thr	Thr	Phe	Asp	Gly	Lys	
			100					105					110			
Tyr	Ala	Phe	Leu	Lys	Thr	Tyr	Asn	Tyr	Ser	Leu	Gly	Ala	Asp	Asp	Leu	
		115					120					125				
Thr	Pro	Phe	Gly	Glu	Gln	Glu	Leu	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	
	130					135					140					
Gln	Arg	Tyr	Glu	Ser	Leu	Thr	Arg	Asn	Ile	Val	Pro	Phe	Ile	Arg	Ser	
145					150					155					160	
Ser	Gly	Ser	Ser	Arg	Val	Ile	Ala	Ser	Gly	Lys	Lys	Phe	Ile	Glu	Gly	
				165					170					175		
Phe	Gln	Ser	Thr	Lys	Leu	Lys	Asp	Pro	Arg	Ala	Gln	Pro	Gly	Gln	Ser	
			180				185						190			
Ser	Pro	Lys	Ile	Asp	Val	Val	Ile	Ser	Glu	Ala	Ser	Ser	Ser	Asn	Asn	
		195					200					205				
Thr	Leu	Asp	Pro	Gly	Thr	Cys	Thr	Val	Phe	Glu	Asp	Ser	Glu	Leu	Ala	
	210					215					220					
Asp	Thr	Val	Glu	Ala	Asn	Phe	Thr	Ala	Thr	Phe	Val	Pro	Ser	Ile	Arg	
225					230					235					240	
Gln	Arg	Leu	Glu	Asn	Asp	Leu	Ser	Gly	Val	Thr	Leu	Thr	Asp	Thr	Glu	
				245					250					255		
Val	Thr	Tyr	Leu	Met	Asp	Met	Cys	Ser	Phe	Asp	Thr	Ile	Ser	Thr	Ser	
			260					265					270			
Thr	Val	Asp	Thr	Lys	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	His	Asp	
		275					280					285				
Glu	Trp	Ile	Asn	Tyr	Asp	Tyr	Leu	Gln	Ser	Leu	Lys	Lys	Tyr	Tyr	Gly	
	290					295					300					
His	Gly	Ala	Gly	Asn	Pro	Leu	Gly	Pro	Thr	Gln	Gly	Val	Gly	Tyr	Ala	
305					310					315					320	
Asn	Glu	Leu	Ile	Ala	Arg	Leu	Thr	His	Ser	Pro	Val	His	Asp	Asp	Thr	
				325					330					335		
Ser	Ser	Asn	His	Thr	Leu	Asp	Ser	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Lys	
			340					345					350			
Ser	Thr	Leu	Tyr	Ala	Asp	Phe	Ser	His	Asp	Asn	Gly	Ile	Ile	Ser	Ile	
		355					360					365				
Leu	Phe	Ala	Leu	Gly	Leu	Tyr	Asn	Gly	Thr	Lys	Pro	Leu	Ser	Thr	Thr	
	370					375					380					
Thr	Val	Glu	Asn	Ile	Thr	Gln	Thr	Asp	Gly	Phe	Ser	Ser	Ala	Trp	Thr	
385					390					395					400	
Val	Pro	Phe	Ala	Ser	Arg	Leu	Tyr	Val	Glu	Met	Met	Gln	Cys	Gln	Ala	
				405					410					415		
Glu	Gln	Ala	Pro	Leu	Val	Arg	Val	Leu	Val	Asn	Asp	Arg	Val	Val	Pro	
			420					425					430			
Leu	His	Gly	Cys	Pro	Val	Asp	Ala	Leu	Gly	Arg	Cys	Thr	Arg	Asp	Ser	
		435					440					445				
Phe	Val	Arg	Gly	Leu	Ser	Phe	Ala	Arg	Ser	Gly	Gly	Asp	Trp	Ala	Glu	
	450					455					460					

Cys Phe Ala  
465

<210> 12

<211> 466

<212> PRT

<213> *Aspergillus terreus*

<400> 12

Met	Gly	Phe	Leu	Ala	Ile	Val	Leu	Ser	Val	Ala	Leu	Leu	Phe	Arg	Ser
1				5					10					15	
Thr	Ser	Gly	Thr	Pro	Leu	Gly	Pro	Arg	Gly	Lys	His	Ser	Asp	Cys	Asn
			20					25					30		
Ser	Val	Asp	His	Gly	Tyr	Gln	Cys	Phe	Pro	Glu	Leu	Ser	His	Lys	Trp
		35					40					45			
Gly	Leu	Tyr	Ala	Pro	Tyr	Phe	Ser	Leu	Gln	Asp	Glu	Ser	Pro	Phe	Pro
	50					55					60				
Leu	Asp	Val	Pro	Glu	Asp	Cys	His	Ile	Thr	Phe	Val	Gln	Val	Leu	Ala
65					70					75					80
Arg	His	Gly	Ala	Arg	Ser	Pro	Thr	His	Ser	Lys	Thr	Lys	Ala	Tyr	Ala
				85					90					95	
Ala	Thr	Ile	Ala	Ala	Ile	Gln	Lys	Ser	Ala	Thr	Ala	Phe	Pro	Gly	Lys
			100					105					110		
Tyr	Ala	Phe	Leu	Gln	Ser	Tyr	Asn	Tyr	Ser	Leu	Asp	Ser	Glu	Glu	Leu
		115					120					125			
Thr	Pro	Phe	Gly	Arg	Asn	Gln	Leu	Arg	Asp	Leu	Gly	Ala	Gln	Phe	Tyr
	130					135					140				
Glu	Arg	Tyr	Asn	Ala	Leu	Thr	Arg	His	Ile	Asn	Pro	Phe	Val	Arg	Ala
145					150					155					160
Thr	Asp	Ala	Ser	Arg	Val	His	Glu	Ser	Ala	Glu	Lys	Phe	Val	Glu	Gly
				165					170					175	
Phe	Gln	Thr	Ala	Arg	Gln	Asp	Asp	His	His	Ala	Asn	Pro	His	Gln	Pro
			180					185					190		
Ser	Pro	Arg	Val	Asp	Val	Ala	Ile	Pro	Glu	Gly	Ser	Ala	Tyr	Asn	Asn
		195					200					205			
Thr	Leu	Glu	His	Ser	Leu	Cys	Thr	Ala	Phe	Glu	Ser	Ser	Thr	Val	Gly
	210					215						220			
Asp	Asp	Ala	Val	Ala	Asn	Phe	Thr	Ala	Val	Phe	Ala	Pro	Ala	Ile	Ala
225					230					235					240
Gln	Arg	Leu	Glu	Ala	Asp	Leu	Pro	Gly	Val	Gln	Leu	Ser	Thr	Asp	Asp
				245					250					255	
Val	Val	Asn	Leu	Met	Ala	Met	Cys	Pro	Phe	Glu	Thr	Val	Ser	Leu	Thr
			260					265					270		
Asp	Asp	Ala	His	Thr	Leu	Ser	Pro	Phe	Cys	Asp	Leu	Phe	Thr	Ala	Thr
		275					280					285			
Glu	Trp	Thr	Gln	Tyr	Asn	Tyr	Leu	Leu	Ser	Leu	Asp	Lys	Tyr	Tyr	Gly
	290					295					300				
Tyr	Gly	Gly	Gly	Asn	Pro	Leu	Gly	Pro	Val	Gln	Gly	Val	Gly	Trp	Ala
305					310					315					320
Asn	Glu	Leu	Met	Ala	Arg	Leu	Thr	Arg	Ala	Pro	Val	His	Asp	His	Thr
				325					330					335	
Cys	Val	Asn	Asn	Thr	Leu	Asp	Ala	Ser	Pro	Ala	Thr	Phe	Pro	Leu	Asn
			340					345					350		
Ala	Thr	Leu	Tyr	Ala	Asp	Phe	Ser	His	Asp	Ser	Asn	Leu	Val	Ser	Ile
		355					360					365			
Phe	Trp	Ala	Leu	Gly	Leu	Tyr	Asn	Gly	Thr	Ala	Pro	Leu	Ser	Gln	Thr
	370					375					380				



Ser Val Glu Ser Val Ser Gln Thr Asp Gly Tyr Ala Ala Ala Trp Thr  
 385 390 395 400  
 Val Pro Phe Ala Ala Arg Ala Tyr Val Glu Met Met Gln Cys Arg Ala  
 405 410 415  
 Glu Lys Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Met Pro  
 420 425 430  
 Leu His Gly Cys Pro Thr Asp Lys Leu Gly Arg Cys Lys Arg Asp Ala  
 435 440 445  
 Phe Val Ala Gly Leu Ser Phe Ala Gln Ala Gly Gly Asn Trp Ala Asp  
 450 455 460  
 Cys Phe  
 465

<210> 13

<211> 466

<212> PRT

<213> *Talaromyces thermophilus*

<400> 13

Met Ser Leu Leu Leu Leu Val Leu Ser Gly Gly Leu Val Ala Leu Tyr  
 1 5 10 15  
 Val Ser Arg Asn Pro His Val Asp Ser His Ser Cys Asn Thr Val Glu  
 20 25 30  
 Gly Gly Tyr Gln Cys Arg Pro Glu Ile Ser His Ser Trp Gly Gln Tyr  
 35 40 45  
 Ser Pro Phe Phe Ser Leu Ala Asp Gln Ser Glu Ile Ser Pro Asp Val  
 50 55 60  
 Pro Gln Asn Cys Lys Ile Thr Phe Val Gln Leu Leu Ser Arg His Gly  
 65 70 75 80  
 Ala Arg Tyr Pro Thr Ser Ser Lys Thr Glu Leu Tyr Ser Gln Leu Ile  
 85 90 95  
 Ser Arg Ile Gln Lys Thr Ala Thr Ala Tyr Lys Gly Tyr Tyr Ala Phe  
 100 105 110  
 Leu Lys Asp Tyr Arg Tyr Gln Leu Gly Ala Asn Asp Leu Thr Pro Phe  
 115 120 125  
 Gly Glu Asn Gln Met Ile Gln Leu Gly Ile Lys Phe Tyr Asn His Tyr  
 130 135 140  
 Lys Ser Leu Ala Arg Asn Ala Val Pro Phe Val Arg Cys Ser Gly Ser  
 145 150 155 160  
 Asp Arg Val Ile Ala Ser Gly Arg Leu Phe Ile Glu Gly Phe Gln Ser  
 165 170 175  
 Ala Lys Val Leu Asp Pro His Ser Asp Lys His Asp Ala Pro Pro Thr  
 180 185 190  
 Ile Asn Val Ile Ile Glu Glu Gly Pro Ser Tyr Asn Asn Thr Leu Asp  
 195 200 205  
 Thr Gly Ser Cys Pro Val Phe Glu Asp Ser Ser Gly Gly His Asp Ala  
 210 215 220  
 Gln Glu Lys Phe Ala Lys Gln Phe Ala Pro Ala Ile Leu Glu Lys Ile  
 225 230 235 240  
 Lys Asp His Leu Pro Gly Val Asp Leu Ala Val Ser Asp Val Pro Tyr  
 245 250 255  
 Leu Met Asp Leu Cys Pro Phe Glu Thr Leu Ala Arg Asn His Thr Asp  
 260 265 270  
 Thr Leu Ser Pro Phe Cys Ala Leu Ser Thr Gln Glu Glu Trp Gln Ala  
 275 280 285  
 Tyr Asp Tyr Tyr Gln Ser Leu Gly Lys Tyr Tyr Gly Asn Gly Gly Gly  
 290 295 300

Asn	Pro	Leu	Gly	Pro	Ala	Gln	Gly	Val	Gly	Phe	Val	Asn	Glu	Leu	Ile
305					310					315					320
Ala	Arg	Met	Thr	His	Ser	Pro	Val	Gln	Asp	Tyr	Thr	Thr	Val	Asn	His
				325					330					335	
Thr	Leu	Asp	Ser	Asn	Pro	Ala	Thr	Phe	Pro	Leu	Asn	Ala	Thr	Leu	Tyr
			340					345					350		
Ala	Asp	Phe	Ser	His	Asp	Asn	Thr	Met	Thr	Ser	Ile	Phe	Ala	Ala	Leu
	355						360					365			
Gly	Leu	Tyr	Asn	Gly	Thr	Ala	Lys	Leu	Ser	Thr	Thr	Glu	Ile	Lys	Ser
370						375					380				
Ile	Glu	Glu	Thr	Asp	Gly	Tyr	Ser	Ala	Ala	Trp	Thr	Val	Pro	Phe	Gly
385				390						395					400
Gly	Arg	Ala	Tyr	Ile	Glu	Met	Met	Gln	Cys	Asp	Asp	Ser	Asp	Glu	Pro
				405					410					415	
Val	Val	Arg	Val	Leu	Val	Asn	Asp	Arg	Val	Val	Pro	Leu	His	Gly	Cys
			420					425					430		
Glu	Val	Asp	Ser	Leu	Gly	Arg	Cys	Lys	Arg	Asp	Asp	Phe	Val	Arg	Gly
	435						440					445			
Leu	Ser	Phe	Ala	Arg	Gln	Gly	Gly	Asn	Trp	Glu	Gly	Cys	Tyr	Ala	Ala
450						455					460				
Ser	Glu														
465															

<210> 14

<211> 475

<212> PRT

<213> Thermomyces lanuginosa

<400> 14

Met	Ala	Gly	Ile	Gly	Leu	Gly	Ser	Phe	Leu	Val	Leu	Leu	Leu	Gln	Phe
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Ser	Ala	Leu	Leu	Thr	Ala	Ser	Pro	Ala	Ile	Pro	Pro	Phe	Trp	Arg	Lys
		20						25					30		
Lys	His	Pro	Asn	Val	Asp	Ile	Ala	Arg	His	Trp	Gly	Gln	Tyr	Ser	Pro
	35						40					45			
Phe	Phe	Ser	Leu	Ala	Glu	Val	Ser	Glu	Ile	Ser	Pro	Ala	Val	Pro	Lys
	50					55					60				
Gly	Cys	Arg	Val	Glu	Phe	Val	Gln	Val	Leu	Ser	Arg	His	Gly	Ala	Arg
65					70					75				80	
Tyr	Pro	Thr	Ala	His	Lys	Ser	Glu	Val	Tyr	Ala	Glu	Leu	Leu	Gln	Arg
				85					90					95	
Ile	Gln	Asp	Thr	Ala	Thr	Glu	Phe	Lys	Gly	Asp	Phe	Ala	Phe	Leu	Arg
			100					105					110		
Asp	Tyr	Ala	Tyr	His	Leu	Gly	Ala	Asp	Asn	Leu	Thr	Arg	Phe	Gly	Glu
	115						120					125			
Glu	Gln	Met	Met	Glu	Ser	Gly	Arg	Gln	Phe	Tyr	His	Arg	Tyr	Arg	Glu
	130					135					140				
Gln	Ala	Arg	Glu	Ile	Val	Pro	Phe	Val	Arg	Ala	Ala	Gly	Ser	Ala	Arg
145					150					155				160	
Val	Ile	Ala	Ser	Ala	Glu	Phe	Phe	Asn	Arg	Gly	Phe	Gln	Asp	Ala	Lys
				165					170					175	
Asp	Arg	Asp	Pro	Arg	Ser	Asn	Lys	Asp	Gln	Ala	Glu	Pro	Val	Ile	Asn
			180					185					190		
Val	Ile	Ile	Ser	Glu	Glu	Thr	Gly	Ser	Asn	Asn	Thr	Leu	Asp	Gly	Leu
	195						200					205			
Thr	Cys	Pro	Ala	Ala	Glu	Glu	Ala	Pro	Asp	Pro	Thr	Gln	Pro	Ala	Glu
	210					215						220			

Phe	Leu	Gln	Val	Phe	Gly	Pro	Arg	Val	Leu	Lys	Lys	Ile	Thr	Lys	His
225					230					235					240
Met	Pro	Gly	Val	Asn	Leu	Thr	Leu	Glu	Asp	Val	Pro	Leu	Phe	Met	Asp
				245					250						255
Leu	Cys	Pro	Phe	Asp	Thr	Val	Gly	Ser	Asp	Pro	Val	Leu	Phe	Pro	Arg
			260					265						270	
Gln	Leu	Ser	Pro	Phe	Cys	His	Leu	Phe	Thr	Ala	Asp	Asp	Trp	Met	Ala
		275					280					285			
Tyr	Asp	Tyr	Tyr	Tyr	Thr	Leu	Asp	Lys	Tyr	Tyr	Ser	His	Gly	Gly	Gly
	290					295					300				
Ser	Ala	Phe	Gly	Pro	Ser	Arg	Gly	Val	Gly	Phe	Val	Asn	Glu	Leu	Ile
305					310					315					320
Ala	Arg	Met	Thr	Gly	Asn	Leu	Pro	Val	Lys	Asp	His	Thr	Thr	Val	Asn
				325					330						335
His	Thr	Leu	Asp	Asp	Asn	Pro	Glu	Thr	Phe	Pro	Leu	Asp	Ala	Val	Leu
			340					345						350	
Tyr	Ala	Asp	Phe	Ser	His	Asp	Asn	Thr	Met	Thr	Gly	Ile	Phe	Ser	Ala
		355					360					365			
Met	Gly	Leu	Tyr	Asn	Gly	Thr	Lys	Pro	Leu	Ser	Thr	Ser	Lys	Ile	Gln
	370					375					380				
Pro	Pro	Thr	Gly	Ala	Ala	Ala	Asp	Gly	Tyr	Ala	Ala	Ser	Trp	Thr	Val
385					390					395					400
Pro	Phe	Ala	Ala	Arg	Ala	Tyr	Val	Glu	Leu	Leu	Arg	Cys	Glu	Thr	Glu
				405					410						415
Thr	Ser	Ser	Glu	Glu	Glu	Glu	Glu	Gly	Glu	Asp	Glu	Pro	Phe	Val	Arg
			420					425						430	
Val	Leu	Val	Asn	Asp	Arg	Val	Val	Pro	Leu	His	Gly	Cys	Arg	Val	Asp
		435					440					445			
Arg	Trp	Gly	Arg	Cys	Arg	Arg	Asp	Glu	Trp	Ile	Lys	Gly	Leu	Thr	Phe
	450					455					460				
Ala	Arg	Gln	Gly	Gly	His	Trp	Asp	Arg	Cys	Phe					
465					470					475					

<210> 15

<211> 487

<212> PRT

<213> Myceliophthora thermophila

<400> 15

Met	Thr	Gly	Leu	Gly	Val	Met	Val	Val	Met	Val	Gly	Phe	Leu	Ala	Ile
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Ala	Ser	Leu	Gln	Ser	Glu	Ser	Arg	Pro	Cys	Asp	Thr	Pro	Asp	Leu	Gly
			20					25					30		
Phe	Gln	Cys	Gly	Thr	Ala	Ile	Ser	His	Phe	Trp	Gly	Gln	Tyr	Ser	Pro
		35					40					45			
Tyr	Phe	Ser	Val	Pro	Ser	Glu	Leu	Asp	Ala	Ser	Ile	Pro	Asp	Asp	Cys
	50					55					60				
Glu	Val	Thr	Phe	Ala	Gln	Val	Leu	Ser	Arg	His	Gly	Ala	Arg	Ala	Pro
65					70					75					80
Thr	Leu	Lys	Arg	Ala	Ala	Ser	Tyr	Val	Asp	Leu	Ile	Asp	Arg	Ile	His
				85					90					95	
His	Gly	Ala	Ile	Ser	Tyr	Gly	Pro	Gly	Tyr	Glu	Phe	Leu	Arg	Thr	Tyr
			100					105					110		
Asp	Tyr	Thr	Leu	Gly	Ala	Asp	Glu	Leu	Thr	Arg	Thr	Gly	Gln	Gln	Gln
		115					120					125			
Met	Val	Asn	Ser	Gly	Ile	Lys	Phe	Tyr	Arg	Arg	Tyr	Arg	Ala	Leu	Ala
	130						135					140			

Arg	Lys	Ser	Ile	Pro	Phe	Val	Arg	Thr	Ala	Gly	Gln	Asp	Arg	Val	Val
145					150					155					160
His	Ser	Ala	Glu	Asn	Phe	Thr	Gln	Gly	Phe	His	Ser	Ala	Leu	Leu	Ala
				165					170						175
Asp	Arg	Gly	Ser	Thr	Val	Arg	Pro	Thr	Leu	Pro	Tyr	Asp	Met	Val	Val
			180					185					190		
Ile	Pro	Glu	Thr	Ala	Gly	Ala	Asn	Asn	Thr	Leu	His	Asn	Asp	Leu	Cys
		195					200					205			
Thr	Ala	Phe	Glu	Glu	Gly	Pro	Tyr	Ser	Thr	Ile	Gly	Asp	Asp	Ala	Gln
	210					215					220				
Asp	Thr	Tyr	Leu	Ser	Thr	Phe	Ala	Gly	Pro	Ile	Thr	Ala	Arg	Val	Asn
225					230					235					240
Ala	Asn	Leu	Pro	Gly	Ala	Asn	Leu	Thr	Asp	Ala	Asp	Thr	Val	Ala	Leu
				245					250						255
Met	Asp	Leu	Cys	Pro	Phe	Glu	Thr	Val	Ala	Ser	Ser	Ser	Ser	Asp	Pro
		260						265						270	
Ala	Thr	Ala	Asp	Ala	Gly	Gly	Gly	Asn	Gly	Arg	Pro	Leu	Ser	Pro	Phe
		275					280					285			
Cys	Arg	Leu	Phe	Ser	Glu	Ser	Glu	Trp	Arg	Ala	Tyr	Asp	Tyr	Leu	Gln
	290					295					300				
Ser	Val	Gly	Lys	Trp	Tyr	Gly	Tyr	Gly	Pro	Gly	Asn	Pro	Leu	Gly	Pro
305					310					315					320
Thr	Gln	Gly	Val	Gly	Phe	Val	Asn	Glu	Leu	Leu	Ala	Arg	Leu	Ala	Gly
				325					330						335
Val	Pro	Val	Arg	Asp	Gly	Thr	Ser	Thr	Asn	Arg	Thr	Leu	Asp	Gly	Asp
			340					345					350		
Pro	Arg	Thr	Phe	Pro	Leu	Gly	Arg	Pro	Leu	Tyr	Ala	Asp	Phe	Ser	His
		355					360					365			
Asp	Asn	Asp	Met	Met	Gly	Val	Leu	Gly	Ala	Leu	Gly	Ala	Tyr	Asp	Gly
	370				375						380				
Val	Pro	Pro	Leu	Asp	Lys	Thr	Ala	Arg	Arg	Asp	Pro	Glu	Glu	Leu	Gly
385					390					395					400
Gly	Tyr	Ala	Ala	Ser	Trp	Ala	Val	Pro	Phe	Ala	Ala	Arg	Ile	Tyr	Val
				405					410					415	
Glu	Lys	Met	Arg	Cys	Ser	Gly	Gly	Gly	Gly	Gly	Gly	Gly	Gly	Gly	Glu
			420					425					430		
Gly	Arg	Gln	Glu	Lys	Asp	Glu	Glu	Met	Val	Arg	Val	Leu	Val	Asn	Asp
		435					440					445			
Arg	Val	Met	Thr	Leu	Lys	Gly	Cys	Gly	Ala	Asp	Glu	Arg	Gly	Met	Cys
	450					455					460				
Thr	Leu	Glu	Arg	Phe	Ile	Glu	Ser	Met	Ala	Phe	Ala	Arg	Gly	Asn	Gly
465					470					475					480
Lys	Trp	Asp	Leu	Cys	Phe	Ala									
				485											